patient's reactive arthritis and Reiter's syndrome are of interest, and pave the way for speculation as to how such phenomena might come about. Currently, there is no definitive answer, but factors such as the site of infection and antigen load are under investigation.

References


Immediate and Long-Term Efficacy of Systemic Antibiotics for Eradicating Nasal Colonization with Staphylococcus aureus

B.A. Lipsky1,2,3, R.E. Pecoraro2,3, J.H. Ahroni3, R.L. Peugeot3

The efficacy of nine antibiotics used in different nonrandomized regimens for eradicating nasal colonization with Staphylococcus aureus was investigated in 72 patients. Dicloxacillin, erythromycin, and three cephalosporins had eradicated colonization in about 75% of cases at early follow-up (≤ 20 days) and in ≤ 50% at late follow-up (≥ 20 days). Clindamycin had eradicated colonization in all 13 patients at both follow-up times. One of two patients was successfully treated with

1General Internal Medicine Clinic (111M), Seattle Veterans Affairs Medical Center, 1660 South Columbia Way, Seattle, WA 98108, USA.
2Division of General Internal Medicine, Department of Medicine, University of Washington School of Medicine, Seattle, USA.
3Medical Service, Seattle Veterans Affairs Medical Center, Seattle, USA.
fleroxacin, as were three of five with enoxacin. Among 21 patients treated with ofloxacin, colonization was eradicated in 20 (95 %) at early follow-up and in all six of those from whom late follow-up cultures were obtained. Thus, clindamycin and ofloxacin appear to be useful systemic antibiotics for eradicating nasal colonization with *Staphylococcus aureus*.

Nasal colonization with *Staphylococcus aureus* increases the risk for staphylococcal infections in postoperative wounds and dialysis access sites (1, 2) and has been associated with recurrent skin infections and with nosocomial infections in nurseries and adult wards (3). In recently reported infections with various *Staphylococcus aureus* strains, termination of outbreaks was hampered by nasal staphylococcal colonization (3). Thus, eradication of nasal *Staphylococcus aureus* colonization may be beneficial in certain clinical situations. Topical agents such as bacitracin, vancomycin and gentamicin are usually ineffective in treating nasal staphylococcal carriage (1, 4), although mupirocin has recently shown promise in early trials (5). In nasally colonized patients with concomitant staphylococcal infections at other sites, topical treatment alone is insufficient. Systemic therapy with anti-staphylococcal penicillins fails to eliminate staphylococcal colonization in most patients, and even when such agents are effective, colonization usually recurs within a few days or weeks (4, 6). Only rifampin has demonstrated efficacy in eradicating nasal colonization (6, 7), but potential adverse reactions and the frequent emergence of resistant staphylococcal strains limit its use. We examined the efficacy of several investigational and currently available antibiotics in eradicating nasal staphylococcal carriage.

**Patients and Methods.** Patients were enrolled at the Seattle Veterans Affairs Medical Center as part of comparative clinical trials of new and approved antibiotics being used primarily for treatment of skin and soft tissue infections. Cultures of the anterior nares were obtained from all patients on the day of enrollment, and whenever possible a repeat nasal culture was obtained during or immediately after the antibiotic course from those patients whose initial culture yielded *Staphylococcus aureus*. “Early follow-up” cultures were defined as those taken within 20 days of starting antibiotic treatment. Efforts were also made to obtain a “late follow-up” culture at three to five weeks after enrollment an a “very late follow-up” culture at more than five weeks after enrollment. The antibiotic regimens, which were determined by the particular study protocol in which the patient was enrolled, are shown in Table 1.

A sterile rayon swab (Culturette, Marion Scientific, USA) was swirled in each anterior nares five times, placed in modified Stuart transport medium and immediately sent to the microbiology laboratory, where it was inoculated on sheep blood, MacConkey, Tinsdale and colistin/nalidixic acid (CNA) agars (Prepared Media, USA) and incubated at 37 °C for 48 h. Colonization was defined as the growth of any *Staphylococcus aureus* colonies, which were identified by catalase and coagulate testing of colonies showing typical morphology.

To determine if the amount of nasal *Staphylococcus aureus* was related to the outcome of antibiotic treatment, growth was recorded in a semiquantitative manner by both the amount (1+ to 4+, depending upon how many of the four streaks on the plate had *Staphylococcus aureus* colonies) and the percentage of growth that was *Staphylococcus aureus*. A quantitative colonization score was devised by multiplying the amount of growth by the percentage of growth represented by *Staphylococcus aureus*.

**Results and Discussion.** Anterior nares cultures were obtained from 332 patients, 80 (24 %) of whom yielded *Staphylococcus aureus*; 72 patients had at least one follow-up culture and constitute the study group. The average age of the colonized patients was 54 years (range 26–77), 96 % were men and 87 % were white. Diabetes mellitus was present in 40 % of all patients cultured and in 44 % of those with nasal staphylococcal colonization. The infections being treated in the colonized patients were of the skin and soft tissue in 58 (80 %), the lower respiratory tract in 13 (19 %) and bone in one (1 %).

*Staphylococcus aureus* was isolated from the wound in 27 (90 %) of the 32 nasally colonized patients who had an open wound but in only 13 (50 %) of 26 with a closed lesion ($X^2 = 6.4, p = 0.01$). The average duration of antibiotic treatment for the underlying infection for colonized patients was 11.1 ± 5.6 (SD) days. Early follow-up cultures were obtained at a mean of 11.9 ± 3.1 (SD) days after the initial culture and 1.5 ± 3.6 (SD) days after completion of antibiotic treatment. The mean interval after the initial culture was 30.2 ± 6.1 (SD) days for the late follow-up and